10[65–01].—JOHN LL. MORRIS, *Computational Methods in Elementary Numerical Analysis*, Wiley, New York, 1983, xii + 410 pp., $23\frac{1}{2}$ cm. Price: $41.95 hardcover, $19.95 paperback.

There is very little to recommend in this book. It is yet another run-of-the-mill book on elementary numerical analysis, covering the standard topics and containing the usual quota of typographical errors and imprecise statements.

P. R.

11[90C05, 90C35].—VAŠEK CHVÁTAL, *Linear Programming*, Freeman, New York, 1983, xiii + 478 pp., 23 cm. Price: $49.50 hardcover, $24.95 paperback.

This book is a very useful addition to the literature on linear programming and network flows. The emphasis throughout is on efficient implementation of the algorithms discussed; much of this computational material is presented for the first time in a textbook suitable for advanced undergraduate and graduate students.

The first ten chapters present the basic theory, using the simplex algorithm as the foundation. Thus the simplex algorithm is first presented on numerical examples, extended to handle any linear programming problem in standard form, and then used to prove the duality theorem. A worthwhile chapter considers the speed of the simplex method. At this point the revised simplex method is introduced, based on a chapter on Gaussian elimination and matrices. Because of the early introduction of Gaussian elimination and notions of sparsity, a valuable discussion of the product factorization of the basis and of the frequency of refactorizations can be presented at a very early stage, and the reader learns the importance of these computational aspects before tackling such topics as the dual simplex method. With the revised simplex method in hand, efficient algorithms for problems with bounded and free variables are presented. This allows the author to derive a general duality theory and prove results on the solvability of linear equations and inequalities. The first part concludes with a discussion of sensitivity analysis, for which the dual simplex method is introduced. Now the reader can appreciate the reasons for the revised form of the dual simplex method, and this is extended to cover problems with bounded variables. This part of the book presents a very modern and computationally-oriented presentation of the basic theory of linear programming. Surprisingly, there is no discussion here of the geometric interpretation of the simplex method.

The next eight chapters give "applications" of the theory of the first part. These include both real-world models and applications to theoretical questions. First there is a very useful discussion of modelling, issues of accuracy, uncertainty, and availability of data, and what aspects of sensitivity analysis should be presented to the decision-maker. Then particular applications to production smoothing, cutting stock and regression problems are described. These problems are used to illustrate special structures in linear programming. There follow chapters on game theory, connections with geometry (with proofs of Carathéodory's and Helly's theorems), and computational methods for enumerating the vertices of a polyhedron.

Network flow problems are treated in the next part. Again the focus is on efficient implementation. Thus the special data structures used recently for the network